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THE SIMULATION OF  
ACUTE PERITONITIS  
BY  
PLEURO-PNEUMONIC DISEASES



BY  
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THE  
SIMULATION OF ACUTE PERITONITIS BY  
PLEURO-PNEUMONIC DISEASES.

THIS paper deals with a class of cases in which it is most easy to mistake thoracic for abdominal disease. This deceptive likeness of two diseases is not of purely theoretical interest, for a mistaken diagnosis is often followed in such a case by an unnecessary operation. This condition, whilst well known to the older physicians, has dropped out of notice in recent years, and that is some excuse for this paper.

CASE 1. *Right diaphragmatic pleurisy and pneumonia with marked abdominal signs, simulating appendicitis with peritonitis.*— This case I owe to the kindness of Dr. P. Kidd. A little girl, aged 11 years, was admitted to the medical wards of the London Hospital in 1895 complaining of pain in the head, but especially in the abdomen. Three days before admission she had severe pain down the right side of the abdomen and vomited bilious fluid several times. When she was first seen at the hospital her abdomen was rigid and especially tender in the right iliac fossa. Her bowels had not been opened for three days and her tongue was brown and dry. Her pulse was 104, full, and not easily compressed and her temperature was 103° F. The thoracic signs which at no time were very marked, were almost absent on admission; she was, however, breathing about 40 to the minute and cut her respirations short because they hurt her in a manner characteristic of pleurisy. She had, moreover, tenderness along the attachment of the diaphragm and the veins were dilated there. By the fourth day after admission there were obscure signs at the right base of some pneumonia, the breath sounds were a little diminished, and there were a few moist râles, but these were also heard at the left base. Her temperature which had remained at about 103° fell by crisis to normal on the fourth day, but soon became irregular and for four or five weeks it frequently reached 102°. During this time the signs of pneumonia and diaphragmatic pleurisy became more distinct and at last left no doubt as to her condition, but had she been admitted to a surgical

instead of a medical ward, and at the present time when so many cases of appendicitis are submitted to early operation instead of seven years ago, I cannot help thinking that her abdomen would probably have been explored.

*CASE 2. Pleuro-pneumonia of the right base; acute abdominal pain and vomiting; no lung signs; herpes labialis; empyema; recovery.*—This case I owe to the kindness of Mr. H. P. Dean and Dr. G. Schorstein. A little boy, aged 10 years, was admitted to the London Hospital in 1899 as suffering from acute peritonitis after an injury. Two days before admission he had received a blow in the lower part of the chest or in the upper part of the abdomen. On the following day, the day before admission, he was seized with severe pain in the abdomen, chiefly in the upper part, and he vomited twice. On admission, his abdomen was found to be somewhat distended, tender, and rigid all over, but especially so in the epigastric region. His bowels had been constipated since the pain commenced and an enema only gave a small result. He lay with both legs drawn up. His temperature was  $99.5^{\circ}$  F. on admission but it rose to  $103^{\circ}$  the same evening. His pulse ranged from 130 to 140 but was of good volume and strength. His respirations were 44 per minute and catchy. The examination of the thorax gave absolutely negative results. Soon after admission he developed herpes labialis and was transferred next day to the medical side. No signs had yet appeared in the thorax but on the following day there was undoubted consolidation at the right base. The temperature fell by crisis on the ninth day of the disease but seven days later it rose again and became irregular and empyema developed on the right side. This was opened and drained and he then made a good recovery.

*CASE 3. Double basal pneumonia with right diaphragmatic pleurisy in a girl the subject of a gastric ulcer; acute epigastric pain with collapse; laparotomy; death.*—This case is certainly the most perplexing one that I have yet heard of; I am indebted for it to Mr. F. S. Eve. A girl, aged 17 years, had been attending the out-patient department of the London Hospital for some months for marked anæmia and gastric ulcer. She had had once before a similar attack to the one which I am about to describe. One morning in 1899 she started for work as usual and on her way was seized in the street with violent epigastric pain and vomiting. She was brought to the hospital at once in a state of collapse. Her pulse was 120 and very thready and her temperature was

104.5° F. Her abdomen was rigid, motionless, very tender, and distended, and these signs were most marked in the epigastric region. She was admitted to the surgical wards as a case of ruptured gastric ulcer and within two hours Mr. Eve opened her abdomen. He explored the anterior and posterior surfaces of the stomach, the greater and lesser curvatures, but found no trace of gastric ulcer nor was there any peritonitis. Unfortunately ether was the anæsthetic given. Misfortunes followed fast. Her cough became so violent that a coil of intestine and some omentum escaped between the stitches and had to be washed and returned and the abdomen again sewn up. On the second day after admission it was clear that she had right basal pneumonia but her temperature had fallen to 101°. On the third day it rose again to 104° and signs of consolidation appeared at the left base and she died on the fifth day from the commencement of the attack. At the post-mortem examination double basal pneumonia and right diaphragmatic pleurisy were found and in the stomach was a shallow ulcer of the size of a six-penny-piece which was not even near perforation. There was no peritonitis. I think that all will admit that this was an impossible case to diagnose correctly. Looking back at the case the only point which should have aroused suspicion was the temperature of 104.5° No record of the frequency of respiration was kept.

CASE 4. *A case of pyopneumothorax of the left base simulating appendicular peritonitis or left subphrenic abscess of gastric origin.*—A male Hebrew, aged 34 years, was admitted to the London Hospital under a medical colleague for "colic and peritonitis" in 1901. I was asked to give a surgical opinion on his abdominal condition. He had not been well for a year, suffering chiefly from pain and wind in the stomach after food but without vomiting. For several weeks he had also had pain in the left lower and back part of his chest with a bad cough and night sweats and wasting. He had been constipated for 12 days. When I saw him his temperature was 101° F., his pulse was about 100 and fairly strong, and his respirations were 38, his nares being vigorously dilated at each inspiration. He was a little icteric but not really jaundiced. His abdomen was rigid and very tender all over, but I could make out no local dullness or resistance and the abdominal wall relaxed between each respiration. The base of the left lung behind was dull on percussion. Vocal resonance and tactile vocal fremitus were diminished. Such breath sounds as could be heard were of a somewhat tubular character. The house physician thought

that the right iliac fossa was more rigid and resistant than the rest of the abdomen. The medical registrar was of opinion that the signs indicated left subphrenic abscess due to a perforated gastric ulcer but the stomach resonance was normal and the spleen was not displaced. My medical colleague agreed with me that the signs appeared to indicate trouble above the diaphragm and arising from the lower lobe of the left lung. Ten days later it was clear that he had pyopneumothorax at the left base, probably arising from a tuberculous focus in the apex of his left lower lobe. A rib was accordingly resected and his temperature fell to normal. He put on flesh and lost all pain but a sinus persisted when he left the hospital.

CASE 5. *A case of pyopneumothorax of the right base simulating appendicular peritonitis.*—On Sept. 12th, 1901, I was called late one evening to see a man in the wards of the London Hospital who was said by my house surgeon to be suffering from "appendicitis and general peritonitis." Two days before admission the patient was running for a train on his way to work in the morning when he was seized with severe pain in the right iliac fossa. He gave up work at 1 P.M. on the same day and took to his bed. Next day his bowels were well opened by a pill and castor oil. He had no vomiting. He had never been seriously ill before. When I saw him in the wards it was clear that he was seriously ill and in great pain. His temperature was 100° F., his pulse was 80, his respirations were 43, and his tongue was furred and dry. His abdomen was hard, rigid, and tender all over, but perhaps a little more so in the right iliac fossa. It relaxed, however, between the respirations for a second and became soft and there was no marked distension or localised dulness or resistance. The heart was normal and the examination of the lungs showed nothing but a little bronchitis and emphysema. I refused to operate because whilst the abdominal signs appeared to me at least doubtful the respirations—43 a minute, with a pulse of only 80—appeared to indicate that the lungs were the source of the trouble. The thing, however, which really decided me not to operate was that I did not think that he could safely take an anæsthetic. I carefully examined him again on the next day with a medical colleague. The abdominal signs had disappeared almost entirely and dulness at the right base with diminished breath-sounds and tactile vocal fremitus, the presence of a pleural rub, and the absence of tubular breathing left no doubt that he had right basal pleurisy. Eight days later the signs at the right base



had much increased and pus was found by an exploring needle. A rib was resected and 24 ounces of pus with air were evacuated. The condition was then found to be one of pyopneumothorax. I saw him once again in February, 1902. He had been attending the out-patient department for a sinus left by the empyema. An energetic dresser had syringed out his cavity with some antiseptic and had nearly choked him by the passage of the fluid through the orifice in the lung into the trachea.

CASE 6. *Traumatic left pleurisy with abdominal signs; laparotomy.*—A labourer, aged 38 years, was admitted to the London Hospital under my care in February, 1901, giving the following history. He was assisting to unload deal planks from a barge when one of the planks swung round suddenly whilst hanging from the crane and struck him violently over the lower left ribs, precipitating him 12 feet into the barge where he alighted on the back of his head. He was slightly concussed and had a scalp wound in the occipital region. He soon recovered from the shock of the fall and the only sign of the injury which could be made out was a fracture of two of his left lower ribs, probably the ninth and tenth, but he was so muscular a man and the part was so tender that the exact ribs broken could not be determined. Within 12 hours of admission a pleuritic rub was heard in the region of the broken ribs. On the next day acute abdominal signs appeared. He complained of violent abdominal pain which was worse down the left side of the abdomen. His abdomen was rigid all over but especially in the left hypochondrium and lumbar regions; the abdominal wall, however, still moved on respiration. Ill-defined dulness was found down the left side and this was thought to be due to blood in the peritoneum. He vomited continuously and the vomitus soon became bilious. His bowels had not been opened since he was admitted and an enema of one and a half pints of soap-and-water was given. This was retained. Retention of urine which had been present since admission persisted. His temperature was 99° F. and his pulse was 75 and of good volume. A diagnosis of laceration of the spleen with recurrent hæmorrhage was made, and laparotomy was decided upon. I must admit that this diagnosis was largely due to the fact that within a fortnight a very similar case had been admitted to the same ward and did not develop any marked abdominal signs until the fifth day when the patient was to have left the hospital. On that day he collapsed and his abdomen became distended and much free fluid was discovered.

Laparotomy was performed and the spleen was found to be torn nearly in two. He died from hæmorrhage on the table whilst the clots were being displaced to find the pedicle. The abdomen in the present case was opened in the left linea semilunaris and the abdominal contents were found to be absolutely normal. The dulness was explained by the enormous muscular development of the abdominal wall, which was so great that the recti and lateral abdominal masses projected into the peritoneum as rounded masses, which were at first thought to be hæmatomata. The great muscular development of the abdominal wall was apparently due to the man being by trade a deal-runner. Some idea of the spasm may be gained by the fact that strand after strand of ordinary silkworm gut snapped without drawing the edges of the incision together, and finally the stoutest silk had to be employed and the anæsthetic vigorously pushed before the abdominal wound was closed. The wound healed by first intention and the patient made an uninterrupted recovery.

Andral<sup>1</sup> appears to have recognised this condition clearly in 1836 and in his book narrates several typical cases. Watson,<sup>2</sup> in his admirable text-book of medicine, quotes Andral and refers to cases of his own in which pleurisy at the right base simulated hepatitis, but he does not appear to have recognised the possibility of confusing diaphragmatic pleurisy with acute peritonitis. Fagge knew the condition well. In his text-book he says: "In exceptional cases the pain is referred to the terminal branches of the intercostal nerves; to the hypochondrium, so as to lead to a mistaken diagnosis of hepatitis; to the loins, so that the case has been called one of lumbago; or to the neighbourhood of the umbilicus, so that peritonitis has been suspected"; and in a note he adds: "I have myself had a patient whose sole complaint was of pain in the crista ilii. I feel sure that if it had not happened that a short time before my attention had been specially directed to this question I should have failed to discover that he had pleurisy, although on applying my stethoscope I at once heard a rub.—C.H.F."<sup>3</sup> Modern medical writers for the most part are vague in their reference to this class of case and many do not even refer to them at all. The condition is altogether unknown to surgeons if we judge from their text-books, and this is all the more unfortunate as it is they who will open the abdomen of the

<sup>1</sup> Andral, translated by D. Spillane, 1836.

<sup>2</sup> Sir Thomas Watson: Principles and Practice of Physic, fifth edition, 1871.

<sup>3</sup> Hilton Fagge: Principles and Practice of Medicine, third edition, vol. i., p. 1026.



pleuritic patient should they be ignorant of this condition after they have caused ether to be administered. My excuse for this paper is to call attention to a pitfall in surgery into which, as may be seen here, I have fallen myself.<sup>4</sup>

The thoracic diseases which can give rise to such severe abdominal signs as to simulate peritonitis are all situated in the lower part of the chest, either in the base of the lung or the adjacent pleura—diaphragmatic or parietal. Three of my cases were those of pleuro-pneumonia of the base of the lung, involving the diaphragm. Two were cases in which apparently a tuberculous focus in the apex of the lower lobe ruptured into the pleural cavity, producing pyopneumothorax. One case was most interesting in that the pleurisy was traumatic, due to a localised injury and associated with broken ribs; it was recognised and yet the abdomen was opened, so definite were the abdominal signs.

The abdominal signs and symptoms which may arise in such conditions are conveniently divided into parietal and visceral.

*Parietal.*—The abdominal wall is acutely tender and painful. The tenderness often extends over the whole abdomen, but in some cases it is unilateral; it may be present only above or below or be more intense in these situations. It will readily be seen that such acute abdominal pain and hyperæsthesia in the right hypochondrium may be mistaken for hepatic and biliary diseases, whilst in the right iliac region an appendicitis would at once suggest itself and in the epigastrium a perforated gastric ulcer. The abdominal muscles are, moreover, in spasm so that the abdominal wall is board-like and hard. So great is this spasm that the deepest anæsthesia is necessary to relax it and the pupils will be widely dilated before the abdomen becomes soft. This has practical application, for if the intestines are allowed to escape they will be returned to the abdomen with the greatest difficulty and the surgeon will find that the stoutest silk alone will stand the strain necessary to close the wound. The respiration is of the costal type, but it will be found on placing the hand upon the abdominal wall that this relaxes for a moment at each inspiration, and this is an important diagnostic sign. Writers on diaphragmatic pleurisy insist on the importance of unilateral exaggeration of costal respiration on the side of the chest affected.

<sup>4</sup> Since this paper was read at the Clinical Society on April 11th, 1902, a paper has appeared on the Simulation of Appendicitis by Acute Intra-thoracic Disease by Dr. Maurice H. Richardson, Boston Medical and Surgical Journal, April 17th, 1902.

*Visceral.*—The visceral signs are distributed along the whole length of the alimentary canal. Gastric disturbance leads to nausea, hiccough, and vomiting which may be urgent and become bilious. The intestines are apparently more or less paralysed, so that the abdomen becomes distended, and this, with the tenderness and spasm of the abdominal wall already referred to, produces a most deceptive resemblance to peritonitis. Constipation is nearly always present and enemas may be retained, so that apparently the rectum has lost its irritability. Even the profound vascular changes which we are in the habit of associating with severe lesion in the splanchnic area are frequently present, at least at the onset of the attack, although it must be admitted that they do not often persist or become more severe as the disease develops.

The patient is often collapsed at the onset of the pain. The extremities are cold and beads of sweat may break out on the forehead, whilst the features are pale and pinched, but in none of my cases did I see the rings round the eyes or the dry shrivelled tongue which one associates with general suppurative peritonitis.

#### DIAGNOSIS.

The diagnosis is nearly always easy if suspicion is aroused and the surgeon is aware of this deceptive condition. The chief points to be observed are the rapidity of the respiration, often 40 a minute or more, which is out of all proportion to the pulse-rate, which is seldom so frequent as 100 a minute and is not weak or wiry. The respirations will often exhibit the curious catch at the top of inspiration which is characteristic of pleurisy. The abdominal tenderness is, moreover, found to be chiefly superficial and firm deep pressure with the flat hand may be permitted. It will then be found that the abdominal wall becomes soft for a moment at each inspiration which is not the case in acute peritonitis. The absence of rings round the eyes and a temperature of about  $103^{\circ}$  should also make one hesitate to diagnose a serious and general peritoneal infection. When once a suspicion has dawned on the mind of the surgeon the patient is comparatively safe, for an examination of the suspected side of the thorax will reveal some dulness or friction sound or some excess of costal movement on that side over the other which will lead him to pause and perhaps to consult his medical colleague; but it must be frankly admitted that direct thoracic signs are often almost entirely lacking for 24 hours or more

The great danger, after all, appears to arise from an auto-suggestion by the patient's surroundings and the circumstances under which he is first seen. The surgeon is summoned by his house surgeon, perhaps in the dead of night, to see a case of "acute peritonitis probably of appendix or gastric ulcer origin." He goes to his well-known ward, where he has seen series of cases of every phase of abdominal disease but seldom or never pleurisy or pneumonia. There he finds a patient suffering from acute abdominal pain, perhaps vomiting, and the house surgeon tells him that the patient has retained an enema. The pain the patient is in, and perhaps his cries when he is being examined, disturbing the whole ward as they do at night, prevent a complete examination. It may be that the surgeon is not quite satisfied that the signs undoubtedly indicate general peritonitis, but his clinical experience at once reminds him how vague the signs of general peritonitis may be; of the case of ruptured liver or spleen in which the signs were so vague for three or four days that operation was postponed until too late; or of that case of ruptured gut which for two days was supposed to be abdominal contusions. In such circumstances it is really not surprising that patients exhibiting the signs which I have mentioned are sometimes operated on. This is an accident always to be deplored, for very frequently ether is administered and this adds bronchitis to the pre-existing lung condition, whilst an extensive abdominal incision seriously hinders coughing. The only guard against such deplorable accidents is to recognise the possibility of their occurrence, and that is my excuse for this paper and the record of these cases.

#### PATHOLOGY.

The pathology is one of referred pain and divides itself into three heads.

1. *Irritation in continuity* of the lower six dorsal nerves will explain the hyperæsthesia and spasm of the abdominal wall. These intercostal nerves supply the diaphragm and lower part of the pleura and here their branches, if not their trunks, will be irritated by an acute inflammatory process. The terminations of the seventh to the eleventh dorsal nerves pass to the abdominal wall and supply the skin and muscles there. If the seventh, eighth, and ninth nerves are chiefly affected the acute epigastric tenderness and spasm will closely simulate a perforated gastric ulcer or if chiefly

hypochondriac and on the right side hepatitis or gall-bladder trouble. When the tenth dorsal nerve is mainly affected the pain is referred to the umbilicus, as it is in so many abdominal complaints, whilst the area of the tenth and eleventh dorsal nerves on the right side is that in which the signs of an acute appendicitis develop. Moreover, the presence of tenderness and spasm on the left side in the tenth and eleventh dorsal areas does not exclude appendicitis, for in the early stage of this affection the pain may be referred to that side. It is interesting to note that three of my six cases terminated in suppuration. This seems to indicate that the inflammation in order to produce such abdominal signs must be severe enough to penetrate to the nerve trunks themselves and to produce actual neuritis.

2. *Referred visceral pain* has been most exhaustively studied by my colleague Dr. Henry Head<sup>5</sup> and it will explain referred abdominal pain from lung disease without pleurisy. The seventh, eighth, and ninth dorsal rami communicantes are those which supply the lungs. When broncho-pneumonia, phthisis, or bronchitis but not lobar pneumonia supervene, even without pleurisy, impulses may pass up to the posterior root ganglia of these nerves and there produce such changes that normal impulses passing through these ganglia from the terminal branches of the nerves in the epigastrium and upper abdominal wall are exalted into painful impressions. The spasm follows in a reflex manner from the pain. Dr. Head tells me that he has seen such cases but none of those related here are explicable on this pathology.

3. *Of the pathology of the visceral signs* to which I have referred, gastric, intestinal, rectal, and vascular, we know very little. Perhaps they are the result of a reflex in the reverse direction to that to which I have just alluded, so that irritation of the six lower intercostal nerves by a pleurisy produces disturbance in the distribution of the three splanchnic nerves which are derived from the same level of the spinal cord. On the other hand, it may be due to irritation of these nerves in continuity as they lie beneath the pleura or pass through the diaphragm to the great sympathetic plexures and ganglia of the abdomen.

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<sup>5</sup> Herpes Zoster, Brain, 1900; Referred Visceral Pain of Heart and Lungs, Brain, 1896.